

REMARKS

Applicants acknowledge receipt of the Examiner's Office Action dated March 7, 2005.

All pending claims 1-11 were rejected. Specifically, the Office Action rejected claims 1 and 3-7 under 35 U.S.C. § 102 as being anticipated by U.S. Patent Publication No. 2002/0036001 issued to Hirotoishi Ise ("Ise"). The Office Action also rejected claims 1-8 and 10 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,358,329 issued to Seiji Muranaka et al. ("Muranaka") in view of U. S. Patent No. 5,336,371 issued to Chung et al. ("Chung"). Claim 9 was rejected under 35 U.S.C. § 103 as being unpatentable over Ise in view of U.S. Patent No. 6,410,417 issued to Nien-Yu Tsai et al. ("Tsai"), and claim 11 was rejected under 35 U.S.C. § 103 as being unpatentable over Muranaka in view of Chung as applied to claim 1, and further in view of U.S. Patent No. 6,284,055 issued to Dryer et al. ("Dryer"). In light of the foregoing amendments and following remarks, Applicants respectfully request the Examiner's reconsideration and reexamination of all pending claims, including newly added claims 21-24.

The Office Action notes classification of original claims 1-20 into 3 distinct groupings. The Office Action notes that during a telephone conversation with the undersigned, the provisional election was made without traverse to prosecute the invention of Group I, claims 1-11. Applicants affirm this election. Accordingly, claims 12-20 have been withdrawn from further consideration.

As noted above, claims 1, 3-7 were rejected under 35 U.S.C. § 102 as being anticipated by Ise, and that claims 1-8, and 10 were rejected under 35 U.S.C. § 103 as being unpatentable over Muranaka in view of Chung. Claim 9 was not rejected under 35 U.S.C. § 102 as being anticipated by Ise, and claim 9 was not rejected under 35 U.S.C. § 103 as being unpatentable over Muranaka in view of Chung.

Applicants have amended claim 1 to include that the tungsten plug is discharged by contacting the electrically interconnect line with the gas introduced liquid. Applicants have reviewed the cited sections of Ise and can find no teaching or fair suggestion of discharging the tungsten plug, either alone or with the remaining limitations of independent claim 1. Rather, Ise seems to contact interconnects with ozone introduced water for the purpose of removing a remover solvent.

Applicants have amended claim 1 by incorporating the limitations of original claim 9. Original dependent claim 9 as noted was rejected under 35 U.S.C. § 103 as being unpatentable over Ise in view of Tsai. Original claim 9 recites, “Contacting the electrically conductive interconnect line with a solution to remove residual polymer after the electrically conductive interconnect line is contacted with the gas introduced liquid.” In rejecting claim 9, the Office Action notes that Ise fails to disclose the step of removing residual polymer after contacting the aluminum interconnect with ozone water. Thereafter, the Office Action asserts that Tsai teaches this limitation missing from Ise.

The present invention prevents degradation of tungsten plugs that are exposed because of imperfect overlay of interconnect over the tungsten plugs. Charged, exposed tungsten plugs will degrade when they come into contact with a solution to remove residual polymer. While Tsai provides a solution to this problem, Tsai’s solution is different from that set forth in claim 9. More particularly, claim 9 recites, “Contacting the electrically conductive interconnect line with a solution to remove residual polymer after the electrically conductive interconnect line is contacted with the gas introduced liquid.” The gas introduced liquid of claim 9 discharges tungsten plugs (see amended claim 1). Tsai does not discharge tungsten plugs by contacting the electrically conductive interconnect line with a gas introduced liquid. Rather, Tsai discharges tungsten plugs using gases or vapors. See column 3, lines 13 - 35. More importantly, applicants

have reviewed Ise and can find no mention that Ise's tungsten plugs are exposed because of imperfect overlay of interconnect over the tungsten plugs. As such, there appears to be no suggestion in Ise that his tungsten plugs should be discharged to prevent tungsten plug corrosion.

The Office Action asserts that it would have been obvious to specify that for the interconnection for Ise, a residual polymer is removed after photoresist removal and oxygen-water exposure as suggested by Tsai. Applicant's note again that Tsai does not teach oxygen-water exposure where the "oxygen-water" is in liquid form. The Office Action asserts that a person having ordinary skill in the art would have been motivated to remove the residual polymer layer after the photoresist removal step, because Tsai shows that etching of aluminum interconnects will generate the polymer layer, but that the polymer layer can safely be removed after photoresist removal and exposure to oxygenated water, citing Tsai, column 3, line 15 through column 4, line 12 in support thereof. Tsai does not teach exposure to oxygenated water. The Office Action also asserts that since it would be apparent that a residual polymer layer on the interconnect would contaminate the device and impede electrical connections, thus necessitating removal, and since Tsai shows that it is feasible to use a polymer stripper without experiencing tungsten corrosion after treatment of the structure with oxygen and water, is well within the preview of a person skilled in the art to apply a residual polymer removal step after the oxygenated water treatment step to the interconnect of Ise, in order to remove any residual polymer generated by the interconnect etch.

For the purposes of this response only, Applicants will assume that one of ordinary skill in the art would want to remove residual polymer from the interconnections of Ise that would otherwise contaminate the device and impede electrical connections. With that assumption, Applicants submit that one of ordinary skill in the art would want to remove residual polymer before the device of Ise is subjected to ozone water. Because Ise does not appear to mention that

his tungsten plugs are exposed due to imperfect overlay of interconnections, there doesn't appear to be any reason why one of ordinary skill in the art would use apply the wet stripper of Tsai before the application of the ozone water in Ise.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. In teaching or suggestion to make the claimed combination and the reasonable expectation of success, must both be found in the prior art and not based on Applicants' disclosure. The initial burden is on the Examiner to provide some suggestion of the desirability of doing what the inventor has done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest that the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. MPEP 2142.

Applicants submit that the office Action fails to establish a *prima facie* case of obviousness in rejecting original claim 9. Before original claim 9 can be rejected over Ise in view of Tsai, the Examiner must present a convincing line of reasoning as to why the artisan would have combined Ise and Tsai. The Office Action asserts that one of ordinary skill in the art would recognize that residual polymer on the interconnect would contaminate the device and impede electrical connections. Residual polymer can be removed from the interconnects of Ise using the wet stripper of Tsai before contacting the electrically conductive line with a gas introduced liquid. Applicants have reviewed Ise and can find no teaching or suggestion that his

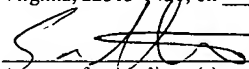
plugs are exposed. Accordingly, there doesn't appear to be any reason why one of ordinary skill in the art would use apply the wet stripper of Tsai before the application of the ozone water in Ise. The office action has failed to provide convincing line of reasoning as to why the artisan would have found the subject matter of claim 9 to have been obvious in light of Ise in view of Tsai. As such, Applicants submits that independent claim 1, which incorporates original claim 9, is patentably distinct over Ise and Tsai.

Claims 2-8, and 10 depend directly or indirectly from independent claim 1. Insofar as independent claim 1 has been shown to be patentably distinguishable, it follows that claims 2-8 and 10 are likewise patentably distinguishable.

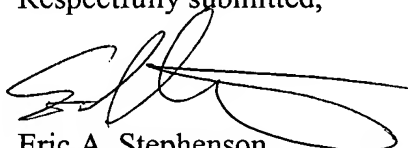
Claim 11 was rejected under 35 U.S.C. § 103 as being unpatentable over Muranaka in view of Chung as applied to claim 1, and further in view of Dryer. Applicants moved the limitations of claim 1 into claim 11 thereby making claim 11 independent. Additionally, Applicants have amended claim 11 to indicate that the tungsten plug is discharged by the contacting the electrically conductive interconnect line with the gas introduced liquid. Applicants assert this added limitation is not taught or fairly suggested by the cited sections of Muranaka, Chung, or Dryer.

CONCLUSION

Applicants submit that all claims are now in condition for allowance, and an early notice to that effect is earnestly solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is requested to telephone the undersigned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop <u>Amendment</u> , Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia, 22313-1450, on <u>6/3/05</u> .	
 Attorney for Applicant(s)	<u>6/3/05</u> Date of Signature

Respectfully submitted,



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